

IN THE CLAIMS:

1. (Previously Presented) A cipher strength estimating device for estimating a strength of a ciphertext which is a transformed text obtained at a final round of a transformation process including: receiving a plaintext; transforming the plaintext using, as a parameter, a session key calculated from a key for use in encryption; and repeatedly further transforming the
5 resulting transformed text which is the plaintext thus transformed to perform stepwise encryption,

the cipher strength estimating device comprising an untransformed text calculating unit and a control unit, the untransformed text calculating unit comprising a session key prospect calculating section and an untransformed text calculating unit body, wherein:

10 the untransformed text calculating unit is operative to receive, as inputs thereto, the plaintext and one of the ciphertext obtained at the final round of the transformation process and a putative transformed text presumed to be a transformed text obtained at a certain intermediate round;

the session key prospect calculating section is operative to: calculate one session
15 key prospect presumed to be equivalent to the session key to be used at a relevant round of transformation by using the plaintext and one of the ciphertext and the putative transformed text or output uncalculability identifier data indicative of inability to calculate when the calculation is impossible; and optionally calculate another session key prospect for the relevant round which is different from the session key prospect already outputted in response to receipt of recalculation
20 request data requesting recalculation;

the untransformed text calculating unit body is operative to: calculate a putative untransformed text presumed to be equivalent to an untransformed text which is not transformed

yet at the relevant round based on the session key prospect and one of the ciphertext and the putative transformed text; and output the putative untransformed text as an output of the
25 untransformed text calculating unit; and

the control unit is operative to: input the plaintext and one of the ciphertext obtained at the final round of the transformation process and the putative transformed text obtained at the certain intermediate round, which make a pair, to the untransformed text calculating unit; receive the putative untransformed text outputted; and repeatedly further input
30 the putative untransformed text as a putative transformed text for a round immediately preceding the relevant round to the untransformed text calculating unit together with the plaintext; and optionally output the recalculation request data to the session key prospect calculating section in response to receipt of the uncalculability identifier data outputted from the session key prospect calculating section to cause the session key prospect calculating section to again calculate said
35 another session key prospect for the immediately preceding round and then output the putative untransformed text based on said another session key prospect.

2 (Previously Presented) A cipher strength estimating device for estimating a strength of a ciphertext which is a transformed text obtained at a final round of a transformation process including: receiving a plaintext; transforming the plaintext using, as a parameter, a session key calculated from a key for use in encryption; and repeatedly further transforming the
5 resulting transformed text which is the plaintext thus transformed to perform stepwise encryption,

the cipher strength estimating device comprising an untransformed text calculating unit and a control unit, the untransformed text calculating unit comprising a session key prospect calculating section and an untransformed text calculating unit body, wherein:

10 the untransformed text calculating unit is operative to receive, as inputs thereto, the plaintext and one of the ciphertext obtained at the final round of the transformation process and a putative transformed text presumed to be a transformed text obtained at a certain intermediate round;

 the session key prospect calculating section is operative to: dynamically create a
15 condition for use in calculating one session key prospect presumed to be equivalent to the session key to be used at a relevant round of transformation by using the plaintext and one of the ciphertext and the putative transformed text; calculate the session key prospect based on the condition thus created or output uncalculability identifier data indicative of inability to calculate when the calculation is impossible; and optionally calculate another session key prospect for the
20 relevant round which is different from the session key prospect already outputted in response to receipt of recalculation request data requesting recalculation;

 the untransformed text calculating unit body is operative to: calculate a putative untransformed text presumed to be equivalent to an untransformed text which is not transformed yet at the relevant round based on the session key prospect and one of the ciphertext and the
25 putative transformed text; and output the putative untransformed text as an output of the untransformed text calculating unit; and

 the control unit is operative to: input the plaintext and one of the ciphertext obtained at the final round of the transformation process and the putative transformed text obtained at the certain intermediate round, which make a pair, to the untransformed text
30 calculating unit; receive the putative untransformed text outputted; repeatedly further input the putative untransformed text as a putative transformed text for a round immediately preceding the relevant round to the untransformed text calculating unit together with the plaintext; and

optionally output the recalculation request data to the session key prospect calculating section in response to receipt of the uncalculability identifier data outputted from the session key prospect
35 calculating section to cause the session key prospect calculating section to again calculate said another session key prospect for the immediately preceding round and then output the putative untransformed text based on said another session key prospect.

3. (Previously Presented) A cipher strength estimating device for estimating a strength of a ciphertext which is a transformed text obtained at a final round of a transformation process including: receiving a plaintext; transforming the plaintext using, as a parameter, a session key calculated from a key for use in encryption; and repeatedly further transforming the
5 resulting transformed text which is the plaintext thus transformed to perform stepwise encryption,

the cipher strength estimating device comprising an untransformed text calculating unit and a control unit, the untransformed text calculating unit comprising a session key prospect calculating section and an untransformed text calculating unit body, wherein:

10 the untransformed text calculating unit is operative to receive, as inputs thereto, the plaintext and one of the ciphertext obtained at the final round of the transformation process and a putative transformed text presumed to be a transformed text obtained at a certain intermediate round;

the session key prospect calculating section is operative to: dynamically create
15 conditions for use in calculating a session key prospect presumed to be equivalent to the session key to be used at a relevant round of transformation by using the plaintext and one of the ciphertext and the putative transformed text; calculate the session key prospect based on the conditions thus created or identify inability to calculate when inconsistency is found between

certain two of the conditions and then output uncalculability identifier data indicative of inability
20 to calculate; and optionally calculate another session key prospect for the relevant round which is
different from the session key prospect already outputted in response to receipt of recalculation
request data requesting recalculation;

the untransformed text calculating unit body is operative to calculate a putative
untransformed text presumed to be equivalent to an untransformed text which is not transformed
25 yet at the relevant round based on the session key prospect and one of the ciphertext and the
putative transformed text; and output the putative untransformed text as an output of the
untransformed text calculating unit; and

the control unit is operative to: input the plaintext and one of the ciphertext
obtained at the final round of the transformation process and the putative transformed text
30 obtained at the certain intermediate round, which make a pair, to the untransformed text
calculating unit; receive the putative untransformed text outputted; repeatedly further input the
putative untransformed text as a putative transformed text for a round immediately preceding the
relevant round to the untransformed text calculating unit together with the plaintext; and
optionally output the recalculation request data to the session key prospect calculating section in
35 response to receipt of the uncalculability identifier data outputted from the session key prospect
calculating section to cause the session key prospect calculating section to again calculate said
another session key prospect for the immediately preceding round and then output the putative
untransformed text based on said another session key prospect.

4. (Previously Presented) A cipher strength estimating device for estimating a
strength of a ciphertext which is a transformed text obtained at a final round of a transformation
process including: receiving a plaintext; transforming the plaintext using, as a parameter, a

session key calculated from a key for use in encryption; and repeatedly further transforming the
5 resulting transformed text which is the plaintext thus transformed to perform stepwise
encryption,

the cipher strength estimating device comprising a first untransformed text
calculating unit, a second untransformed text calculating unit, and a control unit, the first
untransformed text calculating unit comprising an untransformed text calculating unit body and a
10 first session key prospect calculating section, the second untransformed text calculating unit
comprising a second session key prospect calculating section, wherein:

the first untransformed text calculating unit is operative to receive, as inputs
thereto, the plaintext and one of the ciphertext obtained at the final round of the transformation
process and a putative transformed text presumed to be a transformed text obtained at a certain
15 intermediate round;

the second untransformed text calculating unit is operative to receive, as inputs
thereto, the plaintext and one of the ciphertext obtained at the final round of the transformation
process and a putative transformed text presumed to be a transformed text obtained at a certain
intermediate round;

20 the first session key prospect calculating section is operative to: conduct brute-
force search for the session key to be used at a certain round of transformation by using the
plaintext and one of the ciphertext and the putative transformed text; calculate one session key
prospect presumed to be equivalent to the session key to be used at said certain round of
transformation or output uncalculability identifier data indicative of inability to calculate when
25 the calculation is impossible; and optionally calculate another session key prospect for said

certain round which is different from the session key prospect already outputted in response to receipt of recalculation request data requesting recalculation;

the second session key prospect calculating section is operative to: dynamically create plural conditions for use in calculating a session key prospect presumed to be equivalent to the session key to be used at a relevant round of transformation by higher order differential cryptanalysis using the plaintext and one of the ciphertext and the putative transformed text; and calculate one session key prospect based on the conditions thus created or identify inability to calculate when inconsistency is found between certain two of the conditions and then output uncalculability identifier data indicative of inability to calculate;

the untransformed text calculating unit body is operative to calculate a putative untransformed text presumed to be equivalent to an untransformed text which is not transformed yet at the relevant round based on the session key prospect and one of the ciphertext and the putative transformed text; and output the putative untransformed text as an output of the untransformed text calculating unit; and

the control unit is operative to: input the plaintext and one of the ciphertext obtained at the final round of the transformation process and the putative transformed text obtained at the certain intermediate round, which make a pair, to the first untransformed text calculating unit; receive the putative untransformed text outputted; input the putative untransformed text as a putative transformed text for a round immediately preceding the relevant round to the second untransformed text calculating unit together with the plaintext; and optionally output the recalculation request data to the first session key prospect calculating section in response to receipt of the uncalculability identifier data outputted from the second session key prospect calculating section to cause the first session key prospect calculating section

to again calculate said another session key prospect for the immediately preceding round and
50 then output the putative untransformed text based on said another session key prospect.